

## REMARKS

### I. Allowed Claims

The Applicant acknowledges the allowance of claims 12 –16.

The finally rejected claims 1-11 and 17-27 have been amended in an effort to further distinguish them over the teachings of the cited prior as is more fully discussed below.

### II. Amendments

Please note that the references herein to the paragraph numbers of the specification correspond to the paragraph numbers indicated in Pub. No. US2004/0152587, which is the instant published application.

Claim 1 is amended to provide additional descriptive language and limitations to distinguish further the claimed catalyst over the teachings of the prior art. The catalyst composition is now described in the preamble as a middle distillate selective hydrocracking catalyst, which is indicative of certain of the advantages of the inventive catalyst that are noted in the specification. See e.g. paragraphs 50, 107, and 112 of the specification. Claim 1 is further amended to require its carrier to include an amorphous binder component in an amount from 2 to 80 wt %. Support for this limitation is found in paragraph 51 of the specification. The claimed zeolite of the hydrocracking catalyst is amended to require it to have a unit cell size in the range of from 24.14 to 24.38 Å and a micropore volume of at least 0.28 ml/g. Support for these limitations are found in paragraphs 19 and 22 and in claim 5 of the specification.

Dependent claim 2 is amended to narrow the range that is recited for the unit cell size. Support for this amendment is found in paragraph 19.

Dependent claim 5 is amended to increase the claimed micropore volume of the zeolite. Support for this amendment is found in paragraph 22.

Independent claim 9 is amended to remove the term “optionally” recited in step (b) so as to require the claimed acidified solution used in the contacting step to comprise both an acid and an ammonium salt. Paragraph 35 of the specification supports this amendment where it indicates that it has been found that the zeolites of the invention that have the highest surface area and desirable micropore volume can be provided when both an acid and ammonium salt are used in the contacting step. See paragraph 35.

Independent claim 10 is amended to provide similar limitations as are made to claim 1.

Independent claim 17 is amended to recite a range for the unit cell size of the first zeolite to be from 24.10 to 24.40 Å. Support for this limitation is found, for example, in paragraphs 9

and 16, and originally filed claim 1. Concerning the recited boiling temperature range for the middle distillate product, support for the temperature range is found in Example 2, paragraph 109 and in the heading of the last column of both Tables 4 and 5.

New claim 28 further limits the composition of claim 9 by reciting a unit cell size of from 24.60 to 24.78 Å for the starting zeolite used in the making of the high surface area zeolite of the hydrocracking catalyst. Support for this limitation is found in paragraph 33 where it indicates that the indicated unit cell size is most suitable.

New claim 29 further limits the composition of claim 28 by reciting a unit cell size of 24.35 to 24.45 Å for the intermediate zeolite in the manufacture of the high surface area zeolite of the hydrocracking catalyst. Support for this limitation is found in paragraph 30.

New claim 30 further limits the composition of claim 29 by reducing the allowed amount of alkali content of starting zeolite to be less than about 1 % wt. Support for this is found in paragraph 34 where it indicates that the alkali content is most suitably less than 1 wt %.

### III. §112 Rejection of claims 17-22

Claims 17-22 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The Examiner objects to the claimed unit cell size limitation for the recited first zeolite as not being described in the specification and not having a lower limit on the range. He further states that the specification does not refer to the boiling range of 150 to 370 °C, which is recited in claims to define the middle distillate product.

To address the Examiner's above-noted concerns, the unit cell size range is amended to be from 24.10 to 24.40 Å, which such range finds support in the specification as noted above. As for the boiling range, the specifically recited range may be found in the specification also as noted above.

In view of the amendment to claim 17 and in that the boiling range for the middle distillate is indeed supported by the specification, it is respectfully submitted that the Examiner's §112 rejection of claims 17-22 is now moot.

### IV. §103 Rejection of claims 1-11 and 17-27 over U.S. 5,536,687 to Ward in view of U.S. 5,242,677 in view of Cooper et al.

The independent claims 1, 9, 10, and 17 have been amended to address some of the objections presented by the Examiner.

The catalyst of claims 1 and 10 is directed to a middle distillate selective hydrocracking catalyst that includes from 2 to 80 % amorphous binder component, a zeolite having, among

other recited properties, a unit cell size of from 24.14 to 24.38 Å and a micropore volume of at least about 0.28 ml/g. These properties are distinguishable over the cited references. The recited range for the unit cell size of the zeolite is outside of that taught by the Cooper et al patent. Also, there are no disclosures in the cited references of a catalyst using a zeolite having the claimed micropore volume. As noted in the Applicant's specification, the micropore volume is an indication of the pore volume in the pores having a diameter of less than 20 Å and is indicative of high zeolite crystallinity. See e.g. paragraphs 22 and 26. The Cooper et al. patent does not disclose a hydrocracking catalyst having an amorphous binder component as a part of a carrier.

Claim 9 is directed to a hydrocracking catalyst that contains a high surface area zeolite made by a specifically claimed method. The Examiner argues that the Cooper et al patent discloses the Applicant's same starting zeolite and the steam and acid steps, and, in particular, the alkali metal level, silica-to-alumina ratio, calcining temperature overlap those ranges of claim 9.

The Applicant notes that there are significant differences in the method of making the claimed zeolite (as recited in claim 9) and the Cooper et al method of making its zeolite. In the Cooper et al method, the starting zeolite is first, steam calcined, followed by ion exchange with a solution of ammonium salt, followed again by steam calcination, and then followed by treatment with a strong mineral acid. See column 1, line 63 through column 2, line 50. The Applicant's method, on the other hand, involves steam treating a starting zeolite followed by contacting it with a solution comprising both an acid and an ammonium salt. One of a number of differences between the two methodologies is that the Cooper et al method includes a steam treating step in between the ammonium salt treatment step and the acid treatment step, but the Applicant's method does not include such an intervening steam treatment step.

It is further noted that the amendment to the Applicant's claimed contacting step deletes the word "optionally" and requires the contacting solution to comprise both an acid and an ammonium salt. The Applicant's specification indicates that this solution consistently provides for the high surface area and desirable micropore volume of the zeolite. See paragraphs 35 and 84. The micropore volume of the zeolite is an important feature of the zeolite and is indicative of a high zeolite crystallinity. See paragraph 22.

Concerning claim 10, the amendments to this claim are similar to those made to claim 1 and the distinctions made above in respect to claim 1 also apply to claim 10.

Claims 17- 22 are directed to a middle distillate selective hydrocracking process using a hydrocracking catalyst composition comprising a first zeolite having a unit cell size in the range

of from 24.10 to 24.40 Å and other properties. The cited references do not teach such a middle distillate selective hydrocracking process.

Claims 23-27 further define the hydrocracking catalyst of claim 9.

#### V. Newly added claims 28-29


Claims 28-29 are added to the specification. These claims are dependent, either directly or indirectly, from claim 9. Each of these claims recite additional limitations that further distinguish the claimed hydrocracking catalyst composition from the cited references.

#### VI. Conclusion

In view of the amendments made to the claims and the above remarks, it is respectfully submitted that all of the pending claims in addition to those already allowed (i.e. claims 12-16) are patentable. Thus, allowance of the remaining pending claims 1-11 and 17-29 is respectfully requested.

Respectfully submitted,

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